

WHAT IS CLAIMED IS:

Sub 1. A torque controller to control output power to at least two shafts, the torque controller comprising:

5 a differential having at least a first and a second output shaft, each output shaft having an interface to a transfer assembly;

at least a first and a second transfer assembly, said transfer assemblies connected to each interface and to the differential; and

10 a torque difference source connected to each transfer assembly, wherein the first output shaft and transfer assembly receive work from the differential, and the second transfer assembly and output shaft receive work from the torque difference source.

15 2. The torque controller of Claim 1, wherein the amount of work from the second transfer assembly and output shaft is less than or equal to the amount of work from the first transfer assembly.

3. The torque controller of Claim 1, wherein the torque difference source comprises a pump and each transfer assembly comprises a gear train.

20 4. The torque controller of Claim 1, wherein the torque difference source comprises a generator and each transfer assembly comprises a gear train.

5. The torque controller of Claim 1, wherein the torque difference source comprises a compressor and each transfer assembly comprises a gear train.

5 6. The torque controller of Claim 1, further comprising a controller a controllably connected to the torque difference source and the transfer assemblies, the controller receiving inputs from at least two sensors indicative of the output power of the shafts.

10 7. The torque controller of Claim 1, further comprising means for controlling the output of the torque difference source.

15 8. The torque controller of Claim 7, wherein the means is selected from the group consisting of a source of electrical power, a source of hydraulic power, and a source of pneumatic power.

9. A method of transferring power from a first shaft output in a differential to a second shaft output, the method comprising:

providing power to a differential;

20 sensing a difference in shaft output power application;


determining whether a correction in output power is needed;

routing power from the first shaft output to a torque difference source;

routing power from the torque difference source to a second shaft; and

continuing to sense shaft output power.

10. The method of Claim 9, further comprising measuring the difference in shaft output power application.

5  11. The method of Claim 9, further comprising converting power from the first shaft and converting power for routing to the second shaft.

10 12. The method of Claim 11, wherein converting power from the first shaft is selected from the group consisting of converting mechanical power to electrical power, converting mechanical power to pneumatic power and converting mechanical power to hydraulic power.

15 13. The method of Claim 11, wherein converting power for routing to the second shaft is selected from the group consisting of converting electrical power to mechanical power, converting pneumatic power to mechanical power, and converting hydraulic power to mechanical power.

20 14. A torque controller to control output power to two shafts, the torque controller comprising:

a differential having a first and a second output shaft, the first output shaft having an interface to a first transfer assembly and the second output shaft having an interface to a second transfer assembly;

a torque difference source connected to the first and second transfer assemblies; and

means for controlling power applied by the first shaft and transfer assembly to the torque difference source and for controlling power applied by the torque difference source to the second shaft and transfer assembly.

5 15. The torque controller of Claim 14, further comprising means for measuring power in the first and second shafts.

16. The torque controller of Claim 15, wherein the means for measuring power are selected from the group consisting a wheel speed sensor, a shaft speed sensor, a flow sensor, a pressure sensor, an ammeter, a voltage sensor, a steering angle sensor and a yaw rate sensor.

10 17. The torque controller of Claim 14, further comprising means for monitoring power applied by the first shaft and transfer assembly to the torque difference source and by the torque difference source to the second transfer assembly and shaft.

15 18. The torque controller of Claim 14, wherein the means for monitoring power are selected from the group consisting of a computer, a microprocessor, a digital signal processor, an engine electronic controller, an engine control unit, a brake controller, an anti-lock brake controller, and a traction control system.

19. The torque controller of Claim 14, wherein the torque difference source is selected from the group consisting of a generator, a pump and a compressor.

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20. The torque controller of Claim 14, wherein the first and second transfer assemblies are gear trains.

21. A torque controller to control output power to a first shaft and a second shaft, the torque controller comprising:

an automotive differential having first and second shaft outputs;

a first transfer assembly connected to said first shaft output and a second transfer assembly connected to said second shaft output, wherein the first and second transfer assemblies comprise a speed-up gear train;

10 a generator having a first rotor and a second rotor, the rotors of the generator connected to the first and second transfer assemblies; and

15 a controller, connected to the first and second transfer assemblies and receiving signals indicative of a speed of the first and second shafts,

20 wherein the first shaft and first transfer assembly do work and the second transfer assembly and second shaft have work done when the first shaft speeds up, and wherein the second shaft and the second transfer assembly do work and the first shaft and first transfer assembly have work done when the second shaft speeds up.

22. The torque controller of Claim 21, wherein the first and second transfer assemblies do work by spinning the first and second rotors of the generator, and wherein the first transfer assembly has work done when the second rotor speeds up the first rotor and the first shaft, and the second transfer assembly has work done when the first rotor speeds up the second rotor and the second shaft.

23. A torque controller to control output power to a first shaft and a second shaft, the torque controller comprising:

an automotive differential having first and second shaft outputs;

a first transfer assembly connected to said first shaft output and a second transfer assembly connected to said second shaft output, wherein the first and second transfer assemblies comprise a speed-up gear train;

a pump having a first rotor connected to the first transfer assembly and a second rotor connected to the second transfer assembly ; and

a controller connected to the pump receiving signals indicative of a speed of the first and second rotors,

wherein the first shaft and first transfer assembly do work and the second transfer assembly and second shaft have work done when the first shaft speeds up, and wherein the second shaft and the second transfer assembly do work and the first shaft and first transfer assembly have work done when the second shaft speeds up.

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24. The torque controller of Claim 22, wherein the first transfer assembly and first rotor do work by spinning the first rotor of the pump, and the second rotor and second transfer assemblies do work by spinning the second rotor of the pump, and wherein the first transfer assembly has work done when the second rotor speeds up the first rotor, and wherein the second transfer assembly has work done when the first rotor speeds up the second rotor.

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25. The torque controller of Claim 23, wherein the pump is selected from the group consisting of a gear pump, a centrifugal pump, a gerotor pump, a vane pump, and a hydraulic pump.

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26. A torque controller to control output power to a first shaft and a second shaft, the torque controller comprising:

an automotive differential having first and second shaft outputs;

a first transfer assembly connected to said first shaft output and a second transfer assembly connected to said second shaft output, wherein the first and second transfer assemblies comprise speed-up gear trains;

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a compressor having a first rotor connected to the first transfer assembly and a second rotor connected to the second transfer assembly; and

a controller connected to the first and second transfer assemblies and receiving signals indicative of a speed of the first and second rotors,

wherein the first shaft and first transfer assembly do work and the second transfer assembly and second shaft have work done when the first shaft speeds up, and wherein the second shaft and the second transfer assembly do work and the first shaft and first transfer assembly have work done when the second shaft speeds up.

27. The torque controller of Claim 26, wherein the first and second transfer assemblies do work by compressing air, and wherein the first transfer assembly has work done when the second rotor speeds up the first rotor, and wherein the second transfer assembly has work done when the first rotor speeds up the second rotor.

28. The torque controller of Claim 26, wherein the compressor is selected from the group consisting of a centrifugal compressor, a vane compressor, an axial compressor, a rotary compressor, and a screw-type compressor.